

MDBA ANALYSIS:
MODERNISING SUPPLY SYSTEMS FOR EFFLUENT CREEKS –
MURRUMBIDGEE RIVER BUSINESS CASE

PROPONENT: NSW

The Murray-Darling Basin Authority's (MDBA) advice addresses criteria from the Basin Officials Committee agreed *Phase 2 Assessment Guidelines for Supply and Constraint Measure Proposals*. The Guidelines section reference is shown in brackets.

Note on the assessment:

As identified in the business case and as provided in response to requests for additional information on the business case, the outcomes of the proposal will depend on the combined modelling of proposals. The combined modelling comprises NSW's initial integrated modelling of all Murrumbidgee proposals (CARM, Effluent Creeks, Murrumbidgee-Murray-River National Parks and Yanco Creek) with subsequent integrated modelling of measures across the southern Basin. Of these, two projects (CARM and Effluent creeks) have the potential to create general security entitlements. Given their interdependency, it is preferable to complete the assessment in two stages:

1. Assess CARM and Effluent creeks against the benchmark to evaluate the size of general security entitlements available. Modelling should be able to specify requirements for the Murray to address any third party impacts as an inter-valley accounts account.
2. Add the Murrumbidgee-Murray-River National Parks and Yanco Creek as a package to assess additional cumulative benefits and risks from their inclusion, including any unresolved downstream impacts.

This approach may underestimate the two non-entitlement type projects if they are assessed individually but at least ensures the interdependency features in the overall assessment.

Key points/summary

- The proposal in its current form may not meet the definition of a supply measure under the Basin Plan - while NSW has indicated further work is being undertaken to address the issue through the Yanco Creek offtake proposal, this will need to be assessed in conjunction with this supply measure.
- The business case should at a minimum contain a brief description of the ecological values of the effluent creek system that will be affected by this proposal, and a flow management plan (as requested at phase 1) to ensure maintenance of these values. The proposal should also provide greater detail on intended/anticipated ecological benefits arising from any environmental entitlement.
- It is the MDBA's understanding that the existing Murrumbidgee Regulated River Water Sharing Plan identifies water in excess of the long-term extraction limits as planned environmental water

(PEW). The MDBA is undertaking consideration of NSW advice on concerns relating to a potential for the net reduction in the protection of planned environmental water.

- While it is noted that NSW is working with the MDBA to address modelling issues for Murrumbidgee projects, modelling to date of Murrumbidgee proposals (including the effluent creeks proposal) indicated the potential for adverse environmental outcomes across the mid- and lower Murrumbidgee. Unless the adverse outcomes are addressed, such as through further modelling to fix Murrumbidgee benchmark issues, the potential exists for no additional adjustment from the Murrumbidgee measures or even a reduced SDL adjustment from the overall package of measures.

1. Eligibility (s3.1)

1.1. Supply measure requirements (s3.1.1)

The MDBA have concerns that the proposal does not, at least in its current form, meet the requirements of the supply measure which must:

- *Achieve equivalent environmental outcomes to the benchmark environmental outcomes*
The MDBA agreed an approach with NSW to test environmental equivalence for the effluent creeks system in the absence of a formal assessment through the established SDL adjustment framework via application of the ecological elements method. The agreed alternative approach to satisfying this test was that environmental water requirements for the Yanco Creek developed by Alluvium consulting would be the hydrological basis for assessing equivalence. At a minimum, the performance of the environmental water requirement metrics developed for Yanco Creek achieved by the benchmark model should be maintained in the supply contribution scenario. Modelling of the proposed watering regime completed to date does not maintain the achievement of hydrological metrics in the benchmark model and could in principle be considered to not meet the requirements under the Basin Plan (s.7.15).
While NSW has indicated that this is to be addressed via new work undertaken for Yanco creek as part of the Yanco offtake proposal, this has not yet been provided.
- *Have no detrimental impacts on reliability of supply of water to holders of water access rights*
The proponent has acknowledged the possibility of third party impacts downstream due to the reductions in outflows that arise from implementation of this proposal. Rules-based approaches for inter-valley accounts to ensure third party impacts are mitigated are yet to be developed as part of any packaging of Murrumbidgee proposals.

1.2. Measures not included in the benchmark conditions of development (s3.1.2)

The MDBA confirms that the measure was not in the benchmark conditions of development (cl.7.02 of the Basin Plan).

2. Ecological values of the site (s4.2)

No description of ecological values is provided and the proponent indicated in the business case that they did not consider it applicable. While taking into account that this is a water efficiency and operating rule change supply measure rather than a works proposal, this approach alone is considered inadequate. The business case should, at a minimum, contain a brief description of the ecological values of the effluent creek system that will be affected by this proposal. The Alluvium 2013

environmental flows study is one source of relevant information, however this information has not been used to set targets for the ecological values of the system. Whilst the business case for another NSW proposal, the Yanco Creek offtake, provides a detailed description of the ecological/environmental values and features of the Yanco Creek system, this only partially covers the area of this project.

3. Ecological objectives and targets (s4.3)

Ecological objectives and targets are not specified in the proposal and the proponent has indicated in the business case that they do not consider them to be applicable. It is acknowledged that the primary intent of the project is to convert the creek supply system into an efficient delivery system for consumptive use, thereby generating water savings, with ecological benefits a secondary objective. Nonetheless, the business case should more clearly articulate the ecological objectives and targets sought through the stated aim of reinstating a more natural flow regime to the effluent creek system. The preliminary assessment of modelled outcomes based on the updated model representing the package of measures in the Murrumbidgee has highlighted potential adverse ecological impacts (see below for further discussion). This issue will need to be addressed.

4. Anticipated ecological outcomes (s4.4)

4.1. Anticipated ecological benefits (s4.4.1)

As noted above, the primary intent of the project is to convert the creek supply system into a highly efficient delivery system for consumptive use thereby generating water savings. Ecological benefits are a secondary objective. The anticipated ecological benefits are described very generically and only qualitatively i.e. conceptual expected benefits from the introduction of an enhanced environmental watering regime that reduces the current dominance of unnaturally high diversion flows throughout the irrigation season to allow greater variability in flows. In addition, there are anticipated benefits from improved fish movement through the installation of fish ways and modification to block banks. Even taking into account that this is a water efficiency and operating rule change supply measure rather than a works proposal, this level of detail is insufficient.

MDBA advice during Phase 1 highlighted the need for the business case to provide information on the flow management plan for the effluent creek system to ensure that the environmental values in these creek systems are maintained and to ensure that the savings can be used elsewhere. The business case has not provided this information and instead states that a parallel project will be undertaken to establish an optimal environmental watering regime to manage the flows into and within the creek system, which has not yet been provided. Furthermore it is unclear if the parallel project will give explicit consideration to the potential for ecologically undesirable outcomes from returning the creeks to a more natural flow regime — which is possible where a system has been operated in a substantially modified form for an extended period and elements of the ecosystem have adapted to the changed flows.

Given that this proposal seeks to install additional regulation within the creek system to enable re-regulation, storage, movement and supply of water to be tightly managed, there is the potential that this could have either positive or negative impacts on the flow regime of the creek depending on how the additional regulation capacity is operated. Without more information on the environmental watering regime of the creek, the completion of integrated Murrumbidgee supply measure hydrological modelling, and further details of the environmental entitlement potentially created by

this proposal (i.e. the size and utility of the entitlement), it is difficult to assess the benefits of this proposal in a meaningful way.

The Yanco Creek Offtake business case provided a hydrological analysis of the proposal's effect on flow recommendations arising from the Yanco creek environmental flows study (Alluvium 2013). The MDBA has re-applied this analysis to the 19-pack of measures incorporating the effects of two of the three related projects (Yanco Creek Offtake and Modernising supply systems for effluent creeks but not CARM) to provide evidence regarding anticipated ecological benefits. As further discussed below, this analysis has highlighted major concerns regarding potential adverse ecological impacts of this proposal in its current form. There is also a risk of benefits being overestimated and requiring a reconciliation adjustment amount in 2024 due to:

- the need to assess operational efficiency benefits over the long-term to determine the size of equivalent water savings licences;
- the impact of proposed changes to the benchmark model (subject to approval by MDBA, TWG, SDLAAC, BOC and the Authority) on the benefits of this proposal and the package of proposals.

Murrumbidgee entitlement holders bear the risk if the size of the environmental entitlement created is greater than the benefits and hence the proponent has acknowledged the need for conservative modelling. Preliminary modelling and analysis suggests a conservative assessment of the potential benefits of this proposal in reducing operational surplus (e.g. 15% reduction in current surplus at Darlot) however this will need further assessment once the integrated modelling is completed.

4.2. Potential adverse ecological impacts (s4.4.2)

Modelling by the MDBA of the interlinked Murrumbidgee proposals (this proposal, Yanco Creek Offtake and CARM) as an integrated package indicated that the CARM project led to significant negative environmental impacts for the mid and lower-Bidgee. Due to the interconnected nature of the Murrumbidgee proposals, this proposal can therefore not be assessed without further refinement to the CARM project and its operation. Unless the negative environmental outcomes can be addressed, the potential exists for no additional adjustment from the three measures or even a reduction in the SDL adjustment associated with the overall package of measures.

The risk assessment in the business case does not include potential impacts from changed flow regimes on aquatic ecosystems. There is an implicit assumption that reducing artificially high summer flows and providing the opportunity to develop and implement a revised watering regime will result in ecological benefits rather than adverse impacts. The MDBA remains concerned that adverse ecological impacts on the effluent creek system may arise from the implementation of the proposed suite of measures in the Murrumbidgee River because:

- there is uncertainty as to whether additional regulation within the creek system will have positive or negative impacts on the flow regime of the creek, which will depend on how the additional regulation capacity is operated;
- the integrated modelling of proposals in the Murrumbidgee has not yet been completed, which would provide an understanding of the collective impact of measures and how they are likely to interact to alter the flow regime of the effluent creek system (including any impacts from substitution of planned environmental water); and

- the business case stated that alterations to the flows within creek system do not represent a significant change to the flow regime, however only limited modelling or analysis is provided to support this statement. Similarly the Yanco Creek offtake business case described negligible change despite modelling results for some reaches showing a consistent reduction in frequency of fresh, bankfull and overbank events, which could be ecologically significant.

The business case notes that revised creek operating regime alters flows within individual creeks and reaches, which may result in changes to the composition and structure of ecological communities as a consequence of this proposal. It was agreed with the MDBA that if hydrological modelling can demonstrate that the proposal maintains the same achievement of Yanco Creek System Environmental Flows Study flow recommendations (Alluvium 2013) as the benchmark, this will suffice as a test of environmental equivalence.

Results for the proposal using the model received from NSW show that it only achieves 11 out of the 39 flow recommendations (compared to 12 achieved in the benchmark scenario). In addition, as part of its '19 pack' advice to the BOC the MDBA has undertaken a preliminary hydrological analysis of the ability of two of the three related projects (Yanco Creek Offtake and Modernising supply systems for effluent creeks but not CARM) to achieve the flow recommendations arising from the Yanco Creek environmental flows study. This analysis shows that of the 39 flow recommendations across the six reaches, 19 are worse relative to the benchmark, 14 are unchanged, and 6 improve. These results suggest an adverse impact on the hydrological regime of the effluent creek system which is not taken into account in the current SDLAM framework, and therefore reinforces concerns regarding the proposal potentially substituting planned environmental water for held water.

The business case states that a parallel project will be needed to establish an optimal environmental watering regime to manage the flows into and within the creek system (page 45). The implication is that environmental entitlement holders (e.g. the Commonwealth Environmental Water Holder) would use their water in these secondary systems and it is therefore presumed that this has been discussed with relevant parties, but this is yet to be clarified.

In response to an MDBA request for additional information about the effect of the proposal on a known population of endangered trout cod, and the associated advice provided by NSW Fisheries, the proponent indicated that flows in this location will remain within the bounds of historic annual variability. It is unclear if this will be sufficient to secure sustainable trout cod populations and further evidence is requested to demonstrate that the needs of the population have been adequately considered.

The scope of ecological monitoring and security of funding to adequately resource its implementation is ambiguous. In response to a request for additional information the proponent has stated that given the modest scale of change to the hydrology of the Yanco Creek system, it is expected that monitoring associated with this proposal will be targeted towards local effects around the proposed works rather than development of an optimal environmental watering regime. Given that monitoring and evaluation is integral to the successful implementation of the proposed measure, there should be a clear indication of monitoring proposed, that funding is available and the identification of how this will be funded.

5. Hydrology of the area and environmental water requirements (s4.5)

5.1. Current hydrology and proposed changes to the hydrology (s4.5.1)

The Murrumbidgee Benchmark model has been revised to better reflect historical flows and to enable a technically robust assessment of the proposal. This proposal is to re-regulate flows and use drainage to meet irrigation need within the creek systems. This would lead to changes in flow regimes which have been captured in the SDL adjustment model. The proposed changes, however, should not be assessed in isolation. This proposal is to further enhance the post-2009 Water for Rivers projects and is strongly linked to other Murrumbidgee proposals.

5.2. Environmental water requirements (s4.5.2)

Environmental water requirements are not specified in the proposal and the proponent has indicated in the business case that they do not consider them to be applicable. It is acknowledged that the primary intent of the project is to convert the creek supply system into a highly efficient delivery system for consumptive use thereby generating water savings, with ecological benefits only a secondary objective. Nonetheless, a study of environmental water requirements for the Yanco Creek system has been completed and this would seem relevant given the objective of reinstating a more natural flow regime to the effluent creek system.

6. Operating regime (s4.6)

The operating regime is not defined in the business case. As the basis of an environmental works project is to build works to achieve environmental outcomes, this requires a demonstrated understanding of the hydrological and ecological requirements in the Yanco system and a review of possible inundation scenarios. The type and size of structures, their location, and fish passage requirements are based on this analysis, which is not demonstrated in the business case.

The proposal is clear that the broader use of the system will not change, i.e. to deliver water to irrigators, and that the CARM project will determine the operations of the system. The current designs do not focus on the system's ecological requirements (except for allowance of fish passage) and it is unclear whether the structures proposed will hinder environmental flows or become redundant in the future because they were built without consideration of environmental flows.

Given this project incorporates and is dependent on other proposed projects for the Murrumbidgee, combining the design of the three projects would ensure they interact appropriately for constructability and operational purposes and to ensure irrigation and ecological demands are met. Draft designs should also be subject to independent review before proceeding to detailed design.

7. Assessment of risks and impacts of the operation of the measure (s4.7)

It is the MDBA's understanding that the existing Murrumbidgee Regulated River Water Sharing Plan identifies water in excess of the long-term extraction limits as planned environmental water (PEW). There is a significant concern that this proposal substitutes held environmental water for PEW, which could result in a net reduction in the protection of planned environmental water. If so, this would be inconsistent with s.10.28 of the Basin Plan, in which a water resource plan must ensure there is no net reduction in the protection of planned environmental water compared to the protection under State water management law immediately before the commencement of the Basin Plan. It would also be

inconsistent with the commitment not to substitute held environmental water for planned environmental water in the Intergovernmental Agreement.

The MDBA is undertaking consideration of NSW advice on concerns relating to a potential for the net reduction in the protection of planned environmental water.

As discussed further below, modelling completed to date of the Yanco Creek Offtake and effluent creeks proposals has raised concerns about adverse impacts on the hydrological regime of the effluent creeks, which lead to concerns regarding the proposal potentially substituting planned environmental water for held water.

While the proponent has suggested that application of the environmental equivalence scoring framework is the intended approach for assessing impacts/benefits of changes to operational surplus across valleys, it is unclear if the proponent intends this as a method to assess a reduction in PEW. It should be noted that the MDBA does not consider the environmental equivalence scoring framework an adequate test to establish equivalent ecological outcomes from planned environmental water.

There are substantial risks that could inflate both the timeframe and cost of the project during construction and commencement of operations, which will need to be dealt with via stakeholder consultation and detailed design.. For operations this mainly concerns the inundation of private land due to the additional held water behind an increased number of structures. For construction this is mainly cultural heritage disturbance and the impacts of floods from high flows in the Murrumbidgee and the risk assessment should be updated to include these risks. There is also concern this project will not be able to operate the full potential of environmental flows due to the lack of environmental input in the design.

It is recommended that the designs undergo an external review to address these risks. Given the designs are currently sketches this should be done at concept design.

Third party impacts should be addressed, either specifically or referring to a report that covers multiple projects. This includes the outflows at Darlot and how the proposed rules to mitigate potential impacts on inter-valley trade (IVT) could affect River Murray Operations use of inter-valley trade. NSW will work with the MDBA on modelling to address these issues.

This proposal includes works and measures to discharge saline water from Coleambally Irrigation Cooperative Limited and Murrumbidgee Irrigation Limited into the Yanco creek system. This may pose a significant risk to salinity and water quality. The proponent further states in section 4.3.3 that modelling suggested an increase in water availability in the system and it is unclear if consideration has been given to whether this will result in salt mobilisation in the landscape. The risk to water quality and elevated levels of salinity in the Yanco system may be significant and the proponents have not provided any assessment of the risks involved, particularly the risks to water degradation outlined in the Basin Plan chapter 9.02. The proponents should consider an assessment of the risks to water quality and salinity through modelling or otherwise and provide risk mitigation measures.

8. Complementary actions and interdependencies (s4.9)

The project is interlinked with the CARM and Yanco Creek offtake, and should therefore be assessed as a package with these projects to maximise synergies and ensure compatibility in operations.

9. Project governance and project management arrangements (s4.11)

9.1. Legal and regulatory requirements (s4.11.2)

The MDBA is undertaking consideration of NSW advice on concerns relating to a potential for the net reduction in the protection of planned environmental water

The proposal potentially has impacts for the Water Sharing Plan (WSP) for the Murrumbidgee Regulated River Water Source 2016, which is a transitional water resource plan. Similar issues would also arise for a water resource plan for the Murrumbidgee area to be put forward for accreditation under the Basin Plan.

The business case states that IQQM modelling undertaken for the project shows that the proposed package of measures will allow the same consumptive use to be delivered as in the benchmark but with reduced transmission losses and operational surplus. Modelling identified water savings of 14.4GL, equivalent to a 17,000 unit share General Security licence. The business case indicates that the investment will generate water savings that will be converted into a new environmental entitlement held by the CEWH.

The 2003 version of the WSP Murrumbidgee Regulated River was in place immediately before the commencement of the Basin Plan, so the 'no net reduction in the protection of PEW' test is applied against this plan. Section 14(1) of the WSP for the Murrumbidgee Regulated River Water Source 2003 states:

(1) This Plan states the following:

- a) water volume in excess of the long-term average annual extraction limits in clauses 32 and 32A of this Plan may not be taken from this water source and used for any purpose, and
- b) access to water is to be managed as specified in clauses 34 and 34A of this Plan to ensure water volume in excess of the long-term extraction limit is not being taken.

Note: based on modelled diversions it is estimated that this WSP will:

- a) after its 5th year, limit Murrumbidgee extractions to around 1,890,000 ML/year, on average over the long term, and
- b) limit Lowbidgee extractions to around 296,000 ML/ year, on average over the long term.

By doing this, this Plan will ensure that approximately 50% of the long-term average annual flow in this water source (estimated to be 4,360,000 ML/year) will be preserved and contribute to the maintenance of basic ecosystem health.

Unless the proponent can provide evidence that transmission losses and operational surplus are not captured by the definition of PEW as water in excess of the long-term extraction limits set out in section 14(1), the proposed approach of issuing a general security entitlement to the CEWH is problematic. This is because s10.28 requires that a water resource plan ensures no net reduction in the protection of PEW from the protection provided for under State water management law immediately before the commencement of the Basin Plan. Issuing a held environmental water

entitlement would appear to reduce the long-term average volume of PEW. In this regard, the proponent should consider the methods for assessing the effect of changes in the use of PEW for example, use of the flow stress ranking method from the Sustainable Rivers Audit 2. There is merit in applying such a method (or something similar) now as it is possible this type of assessment will be triggered if NSW submit an updated Murrumbidgee Water Resource Plan for accreditation which requires a demonstration that there is no net reduction in the protection of PEW compared to the protection provided under State water management law immediately before the commencement of the Basin Plan. Consideration should also be given to the effect on the long-term average volume of PEW under the plan.

An alternative approach that could be considered is to maintain water savings as PEW rather than issue them as a held entitlement. If this approach was adopted, careful consideration would still be required to ensure the new arrangements for PEW would meet the requirements of s.10.28.